

WHAT IS CLAIMED IS:

1. A method for forming a SOI structure, comprising:

5 providing a silicon substrate and a support substrate;

implanting an impurity into said silicon substrate to a first depth;

bonding said silicon substrate to said support substrate;

flashing said support substrate with radiation energy which impinges on a surface

of said support substrate for a substantially instantaneous time to go through said support

10 substrate and heat the first depth of said silicon substrate to an annealing temperature.
2. The method of Claim 1, wherein said radiation energy is derived from a radiation energy source comprising a high-intensity lamp.
- 15 3. The method of Claim 2, wherein said high-intensity lamp comprises a Xe arc lamp.
4. The method of Claim 1, wherein said support substrate comprises quartz.
- 20 5. The method of Claim 1, wherein said radiation energy comprises an average power of between about 0.5 J/cm² and about 100 J/cm².
6. The method of Claim 1, wherein said first depth comprises a portion of said silicon substrate between 10 nm and about 1 mm below a surface of said silicon

25 substrate.
7. The method of Claim 1, wherein said annealing temperature is between about 500 °C and 1400 °C.
- 30 8. The method of Claim 1, wherein said substantially instantaneous time is between about 1 nanosecond and about 10 seconds.
9. A method for forming an SOI structure, comprising:

providing a first substrate and a second substrate;
applying a layer of SiO₂ to said first substrate;
implanting an impurity through said layer of SiO₂ into said first substrate
to a first depth;

- 5 bonding said first substrate to said second substrate with said layer of SiO₂
disposed therebetween; and
 flashing said first depth to heat said first depth to an annealing temperature.

10 10. The method of Claim 9, wherein said flashing comprises energizing a
high-intensity lamp for a substantially instantaneous time.

11. The method of Claim 10, wherein said substantially instantaneous time is
between about 1 nanosecond and about 10 seconds.

15 12. The method of Claim 9, wherein said second substrate comprises quartz.

13. The method of Claim 9, wherein said second substrate comprises SiC,
GaAs, GaP, InP, GaN, and Al₂O₃.

20 14. The method of Claim 9, wherein said first depth comprises a portion of
said first substrate between 10 nm and about 1 mm below a surface of said silicon
substrate.

25 15. The method of Claim 9, wherein said annealing temperature is between
about 500 °C and 1400 °C.